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COMPLETE SPECIFICATION

Auxiliary Device for Lathes

I, KARL BASS, a citizen of the Federal Republic of Germany, of 21, Keltenstrasse, Oberkochen, Württemberg, Germany, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

For the purpose of machining thin and long work-pieces on centre lathes or turret lathes auxiliary devices are used which are clamped on a support or on the pinole of the lathe and which have a lunette facing the toolholder and having a counterbearing seating for guiding the work-piece. The various known devices have proved useful for various machining operations, but are not well suited or not at all suited for machining very long and thin work-pieces such as 2 millimetre thick round bars which are to be reduced to a diameter of 0·5 millimetre, especially if a long series of such operations is to be performed.

The object of the present invention is to provide an improvement in such devices in order to make them suitable for carrying out reliably operations of the above mentioned type. The invention is based on the perception of the fact that the mounting of the work-piece is subject to very severe requirements for work such as the machining of a round bar down to 1 or 2 millimetres or even 0·5 millimetre along a considerable length, particularly if a series of such operations is to be performed.

According to the present invention an auxiliary device for turret lathes, centre lathes or the like, for machining very thin and long work-pieces, has a tool holder and a lunette providing a counter-bearing which is situated substantially in opposition to the tool with respect to the work-piece axis, the counter-bearing being formed by two surfaces which surfaces form an angle of from 50° to 70° to one another, and the counterbearing being so arranged relatively to the tool holder that in operation the unworked part of the work-piece is supported by the counterbearing and is so arranged relative to the tool holder that the tool acts on a work-piece at a point intermediate the lunette and another support provided by the lathe.

This arrangement provides a device that is particularly suitable for the above-mentioned operations. It is known to provide lunettes that have two relatively fixed bearing surfaces, but the angle between these surfaces is generally about 90°, and moreover they do not have the other features of the present invention, i.e. absence of moving parts, and contact of the counterbearing with the unworked work-piece. It is also known to provide lunettes in which the surfaces contacted by the work-piece, viz. the surfaces tangential to the work-piece, are at an angle of about 60° to one another, but only in the case of lunettes which are formed as ball bearings, or have rollers. These lunettes, on account of the play due to the movable parts, are not suitable for fine work such as can be executed with a device according to the invention.

The arrangement of the counterbearing in such manner that it precedes the tool is known in itself, but only in a construction that does not include all the above-mentioned features of the present invention.

Precise positioning of the work-piece, as is required for turning it to a very small diameter with great accuracy and uniformity, is obtained only by combining the three features referred to, namely:—

(a) The counterbearing is formed by two relatively fixed surfaces.

(b) The angle between the surfaces is about 60°.

(c) The counter-bearing is so arranged as to precede the tool as the latter moves along the work.

[Price 3s. 6d.]

The first feature requires no special comment. It is obvious that in the case of lunettes with rolling parts the play in the roller bearing is considerable in relation to the very small diameter of a work-piece produced by a device according to the invention, and is not permissable.

The second feature of the invention, namely an angle of about 60° between the counterbearing surfaces, provides a satisfactory and reliable three-point support, two points being formed by the surfaces of the counterbearing, and the third by the turning tool. The work-piece is pressed into the angle between the surfaces by the tool during a turning operation, and effects the secure seating of the work-piece that is required for working to very small diameters.

The importance of the third feature is as follows. In a counterbearing which follows the turning tool, as is generally the case in known constructions, the work-piece must first be turned to the required diameter over a short length without a counterbearing. Then the work-piece is released and the whole length to be worked is withdrawn from the holder, so that only a short end portion is held by the holder. The pre-turned part of the work-piece is then supported against the counterbearing, or conversely the lunette is pressed against the said part with a certain pressure. If this pressure is too high or too low, then the very thin turned part of the work-piece will be deflected one way or the other by the counterbearing, or by the cutting tool that was used for the initial turning operation, with the result that during further turning there will be a change in diameter.

The diameter of the work-piece will thus be too large, if the lunette has not been applied with sufficient pressure and the work-piece can deflect towards the counterbearing under the pressure of the tool. After a short time this part of the work-piece, of too large diameter, comes into the zone of the counterbearing and is now pressed in the other direction by the lunette against the tool, which again results in reduction of the diameter to a value smaller than was intended.

With a counterbearing that follows the work-piece, there will be produced work-pieces that have wavy surfaces instead of being cylindrical. The smallest deflection is sufficient to make the work-piece useless.

It is desirable, in a device according to the invention, to arrange the counterbearing so that the surface from which the surface of the work-piece runs off, i.e., the surface which in the peripheral direction of the rotating work-piece is directly ahead of the turning tool, is parallel or substantially parallel to the longitudinal direction of the tool. Advantageously the said surface in front of the tool is inclined somewhat with respect to the longitudinal axis of the tool, so that its outer end is somewhat nearer to the said axis than is its inner end. In this way the seating of the work-piece is further improved and the usefulness of the tool is increased as regards the range of diameters of the work-pieces to be treated. The angle between the said surface and the longitudinal axis of the tool may for example be from say 5° to 10°.

The lunette is preferably and in a manner known *per se*, mounted for angular adjustment about, and radial adjustment relative to, an axis which is parallel to the axis of rotation of the work-piece so that it can be adjusted to work-pieces of different diameters. The result of this arrangement is that the angle of inclination of the bearing surface which in angular sense is disposed ahead of the lathe tool becomes smaller in inverse ratio to the increasing diameters of the work-pieces, thus achieving a reliable guiding of the work-piece on the said surface and preventing the work-piece from being lifted off the said surface. A further resulting advantage is more uniform stress on the two bearing surfaces and thus a longer working life. The two surfaces of the V-shaped counterbearing are preferably plated with "Widia" (Regd. T.M.) thus preventing to the highest possible degree, wear and tear during machining, and affording without adjustment completely uniform machining of a whole series of work-pieces.

It is desirable to lubricate the two bearing surfaces. It has been found that otherwise bigger turnings or chips are removed reliably but that finer chips get between the work-piece and the bearing surfaces and may thus impair precise machining. If the surfaces are lubricated, however, the fine chips are constantly washed away and thus cannot get in between the work-piece and the surfaces of the counterbearing. The lubricating and/or flushing liquid may be supplied through a duct which opens into the apex of the angle formed by the said two surfaces.

In order to solve the problem of machining very thin and long work-pieces, in addition to the shape of the counterbearing, the mounting and the adjustability of the lathe tool are of high importance. The lathe tool is for this purpose preferably mounted in a support which is capable of fine adjustment.

An embodiment of the present invention is illustrated by way of example in the accompanying drawing, in which:—

Fig. 1 shows a side view of the auxiliary equipment, and

Fig. 2 a front view, seen in the direction of the axis of rotation of the lathe.

The equipment includes a holder 1 which is mounted by its bore 2 on the pinole of the lathe for example and is secured by a screw 3. The holder has at its lower end a slot 4 for a screw 5 by means of which the lunette 6 is secured. When the screw 5 is loosened, the

lunette can be both turned and adjusted radially in relation to the holder by sliding the screw 5 in the slot 4.

The lunette 6 has a V-shaped recess 7 the two surfaces 8 and 9 of which are plated with hard metal and form the counterbearing. In the case illustrated the two surfaces form an angle somewhat less than 60°, for example 50° to 55°, the line of symmetry of which is directed approximately towards the point of the lathe tool 10. The latter is held by three fixing screws 11 and is seated in a slide 12 which is operated by a spindle 13. The said lathe tool 10 normally has a position in relation to the surface 8 in which the outer end of the latter if extended would cut the axis of the lathe tool at an angle of the order of say 5° to 10°. The slide 12 is seated in the bed 14 which is mounted by means of a hollow pivot pin 15 in a bore of the holder 1 and is secured therein by a screw 16. The spindle 13 has at its outer end a conical surface 17 which is provided with a scale. The lunette has a bore 18 which opens into the apex formed by the two surfaces 8 and 9, and to which can be directly connected a flexible conduit for the supply of lubricant. A work-piece when in position is supported by the lathe in customary manner as well as by the counter-bearings.

What I claim is:—

1. An auxiliary device for turret lathes, centre lathes or the like, for machining very thin and long work-pieces, said device having a tool holder and a lunette providing a counter-bearing which is situated substantially in opposition to the tool with respect to the work-piece axis, the counter-bearing being formed by two surfaces which surfaces form an angle of from 50° to 70° to one another, and the counter-bearing being so arranged relatively to the tool holder that in operation the unworked part of the work-piece is supported by the counter-bearing and is so arranged relative to the tool holder that the tool acts on a work-piece at a point intermediate the lunette and another support provided by the lathe.

2. An auxiliary device according to claim 1 wherein the counter-bearing is so arranged relatively to the tool holder that the tool engages the work-piece approximately at the bisector of the angle between the said surfaces.

3. An auxiliary device according to claim 1, characterised in that one of the surfaces of the counter-bearing is parallel or nearly parallel to the longitudinal axis of the lathe tool.

4. An auxiliary device according to claim 3 wherein the said surface is inclined with respect to the longitudinal axis of the tool in such manner that its outer end is nearer the tool than is its inner end.

5. An auxiliary device according to claim 4, wherein the angle between the axis of the lathe tool and the said surface is about 5° to 10°.

6. An auxiliary device according to any of claims 1 to 5, wherein the lunette and/or the lathe tool are mounted for angular adjustment around an axis parallel to the axis of rotation of the work-piece.

7. An auxiliary device according to any of claims 1 to 6, characterized in that the lunette and/or the lathe tool are radially adjustable in relation to the axis of rotation of the work-piece.

8. An auxiliary device according to any one of claims 1 to 7, wherein the tool is carried on a pivotally adjustable support capable of fine radial adjustment.

9. An auxiliary device according to any of claims 1 to 8, including means for lubricating the mutually inclined surfaces of the counterbearing.

10. An auxiliary device according to claim 9, provided with a lubrication duct which opens at the apex of the angle between the said two surfaces of the counterbearing.

11. An auxiliary device according to claim 9 or 10, wherein a flexible lubrication tube is connected directly to a bore formed in the pivotally adjustable lunette.

12. An auxiliary device for lathes, substantially as hereinbefore described with reference to the accompanying drawings.

REDDIE & GROSE
Agents for the Applicants,
6, Bream's Buildings, London, E.C.4.

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1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

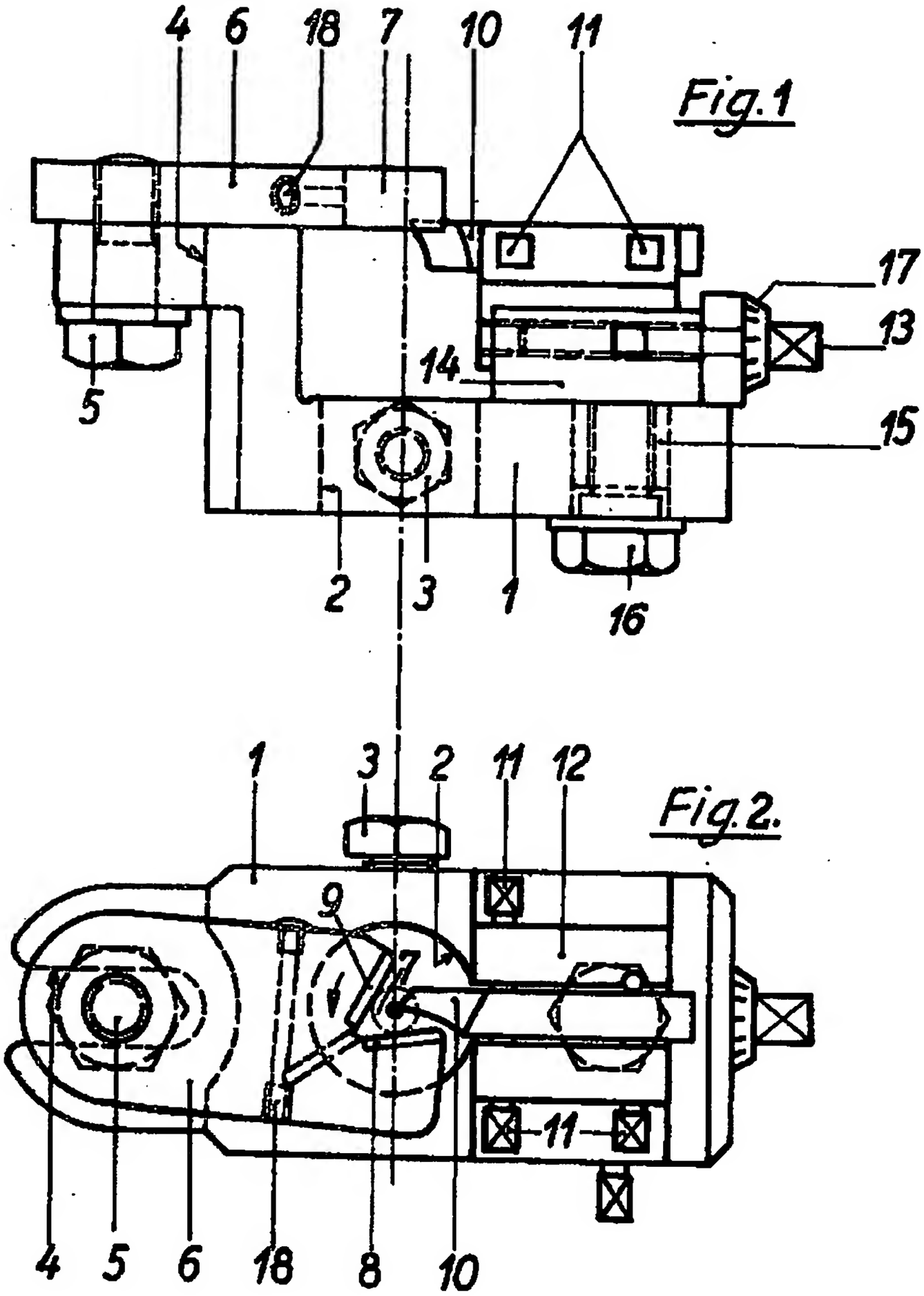

Fig.1

Fig.2.